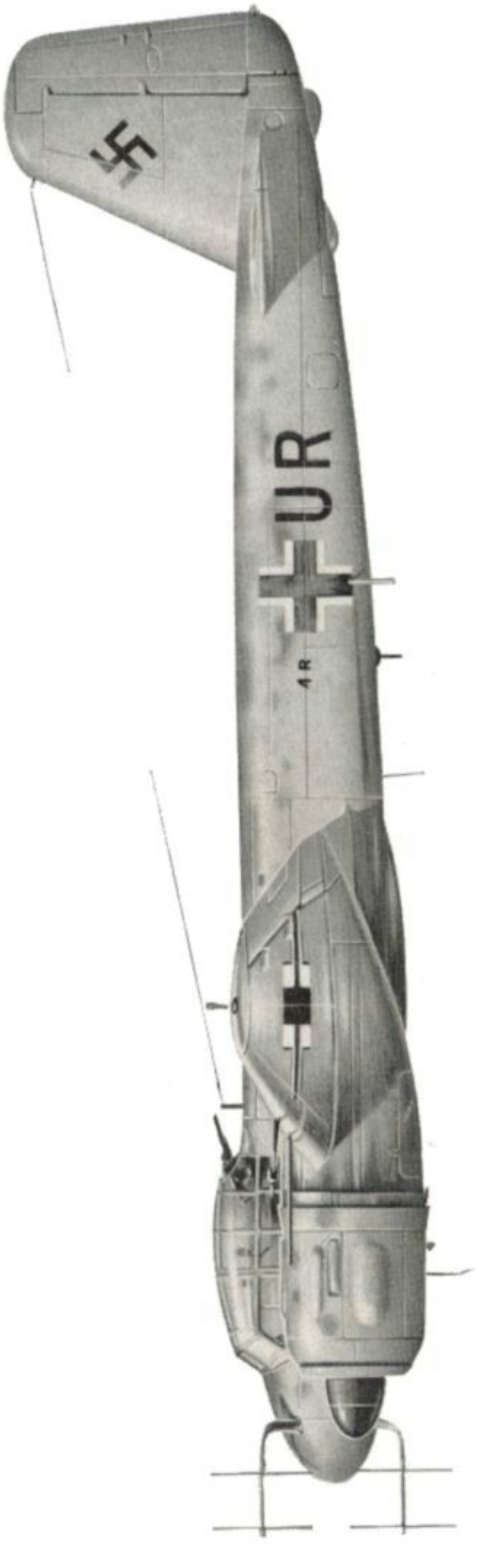
PROFILE PUBLICATIONS

The Junkers Ju 88 Night Fighters



NUMBER 148

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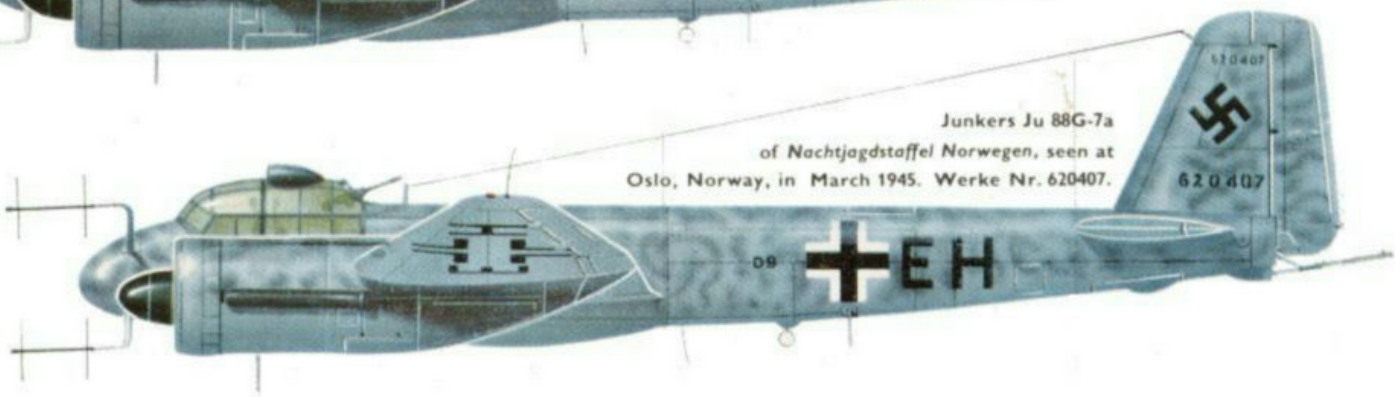
"*Englandblitz*" insignia of *Luftwaffe* night fighter units, carried below cockpit of R4 + FH.

Junkers Ju 88C-2 of 1st *Staffel*, *Nachtjagdgeschwader* 2; Gilze-Rijen, Holland, spring 1941.

Junkers Ju 88C-6c of 4th *Staffel*, *Nachtjagdgeschwader* 1; St. Trond, Belgium, March 1944.

Junkers Ju 88C-6b of 3rd *Staffel*, *Nachtjagdgeschwader* 4; Mainz-Finthen, Germany, March 1944.

Junkers Ju 88G-6c of Staff Flight, II *Gruppe*, *Nachtjagdgeschwader* 100; Eastern Front, late 1944.

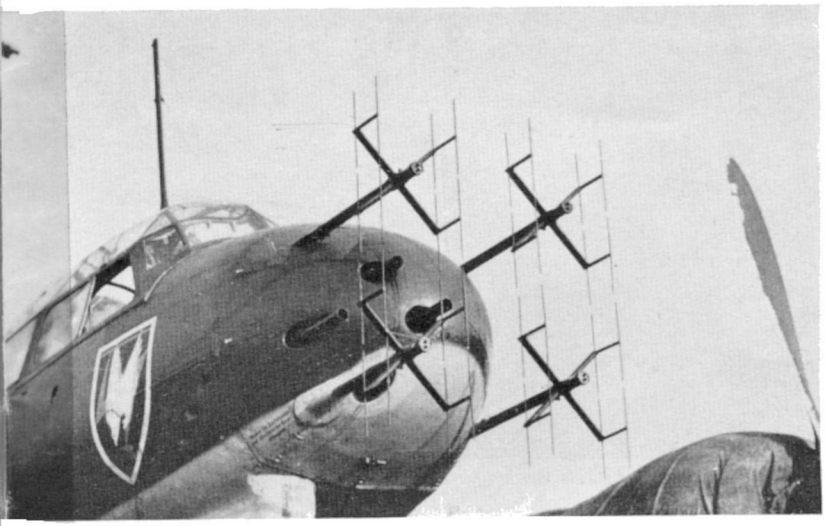


Junkers Ju 88G-7a of *Nachtjagdstaffel Norwegen*, seen at Oslo, Norway, in March 1945. Werke Nr. 620407.

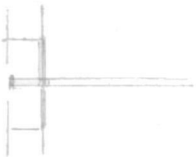
© ARTHUR STURGESS

Details of camouflage patterns and *Geschwader* codes:

(left) soft-edged mottling on G9 + KM: (centre) more sharply defined pattern on W7 + AC: (right) continuous wavy lines on D9 + EH.



Close-up view of the Matratzen *aerial array of the* FuG 202 Lichtenstein BC *radar in the nose of a Ju 88R-1; the individual aerial elements were 30 cm. long. The emblem of the* Luftwaffe *night fighter force, the* Englandblitz, *may be seen below the cockpit.* (Photo: Crown copyright)



The Junkers Ju 88 Night Fighters

by Alfred Price

It is a paradox, but none the less true, that not one of the four really great night fighting aircraft of the Second World War—the Beaufighter and the Mosquito, the Messerschmitt Bf 110 and the Junkers Ju 88—was designed for that rôle. Indeed, the two which bore the brunt of their respective nation's night fighting efforts during the final year of the conflict, the Mosquito and the Junkers Ju 88, did not even start life as fighters. Both were conceived as high speed bombers.

During and after the war a few R.A.F. pilots were fortunate enough to log flying time on each of the four "greats". These men all recall the Ju 88 with affection; a "nice stable machine, a gentleman's aircraft". That the Ju 88 was noted as the most ladylike of the great night fighters is hardly surprising, for she was easily the biggest. The aircraft was more than two tons heavier than her nearest rival—the Beaufighter—and had a wing span longer by seven feet. For a fighter the Ju 88 was a big plane.

NIGHT FIGHTER DEVELOPMENT

Following the successful early flight trials of the prototype Ju 88 high speed bomber (see *Profile* No. 29), the Junkers Flugzeugwerke investigated the possibility of adapting the design to the heavy fighter rôle. In September 1938, nearly two years after the flight of the first Ju 88, the Ju 88V-7 took the air; also known as the Ju 88Z (*Zerstörer*), it was to be the forerunner of nearly four thousand heavy fighters. Its main difference from the Ju 88V-6—the production prototype of the Ju 88A bomber—was the metal fairing in place of the glazed bomb aimer's nose and the removal of the blister under the starboard side of the cockpit. The forward-firing armament comprised two 20 mm. MG FF cannon and two 7·9 mm. machine guns. Instead of the bomber's four man crew, the fighter carried only three—pilot, engineer and radio operator; the engineer sat next to the pilot, his main task being that of reloading the drum-fed MG FF cannon. The Ju 88V-7 had a maximum speed of 312 m.p.h. at 13,000 feet, or roughly the same as that of the fastest versions of the Messerschmitt Bf 110 then on the point of entering service. However the range of the Ju 88 heavy fighter—1,800 miles—was roughly three times that of its smaller counterpart. The modified bomber was ordered into production as the Ju 88C.

During July and August 1939 a few early production Ju 88A-1 bombers were modified into heavy fighters, under the designation Ju 88C-0. These had the solid nose of the V-7, but retained the blister under the starboard side of the nose; the latter was a feature which was to remain with the Ju 88C throughout its life. Some Ju 88C-0's saw action during the Polish campaign, where they served in the long-range ground attack rôle.

The Ju 88C-1, C-3 and C-5 were all to have been fitted with the 1,600 h.p. BMW 801 powerplant, in place of the 1,100 h.p. Jumo 211 which was standard on the bomber versions; but the BMW units also

Head-on view of the Ju 88R-1; apart from the substitution of air-cooled BMW engines for the liquid-cooled Jumo 211's, this variant was identical to the Ju 88C-6b. (Photo: Crown copyright)

powered the Fw 190A which had a higher priority, and these versions of the Ju 88 did not go into production.

The next model to enter service was the C-2, with a revised armament of one 20 mm. MG FF and three 7·9 mm. guns firing forward, one 7·9 mm. MG 15 firing rearwards and a bomb load of up to 1,100 pounds. The C-2 was first issued to *Luftwaffe* units in the early summer of 1940.

The Ju 88C had been intended for use as a long range day fighter. But on 15th May 1940 R.A.F. Bomber Command started attacking industrial targets in Germany by night. At that time the *Luftwaffe* had no effective night fighter arm; target defence was the responsibility of the *Flak* units. The latter proved unable to carry out this task, and on 20th July Göring ordered General Kammhuber to set up a night fighter division. Kammhuber moved quickly. At the end of July *Nachtjagdgeschwader 1* comprised I./N.J.G. 1—formerly I./Z.G. 1—with Bf 110's, II./N.J.G. 1 with Ju 88C-2's, and III./N.J.G. 1—formerly IV./J.G. 2—with Bf 109's.

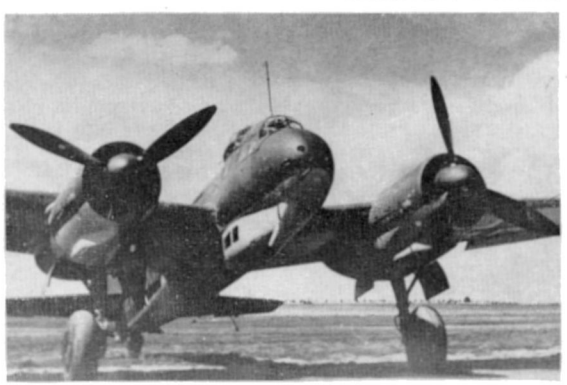
II./N.J.G. 1 was re-designated I./N.J.G. 2 in September 1940, and the unit's Ju 88's began night intruder operations against Bomber Command bases in Eastern England. Aircraft on the final approach to landing had little reserve speed for manoeuvrability, and were virtually "sitting ducks"—a fact known only too well to the crews. The number of R.A.F. bombers actually shot down by the intruders was small, but the latter's effect was great. Many aircraft were seriously damaged in heavy landings: there was no thought of "going round again" if intruders were about, no matter how bad the approach. I./N.J.G. 2 maintained almost nightly patrols over British airfields until October 1941, when the unit was moved to the Mediterranean. Hitler specifically forbade any diversion of fighters from the defence of Germany to resume the intruder operations over England; he insisted that the defences should concentrate their activities over the German homeland, where their successes would be seen by the civilian population.

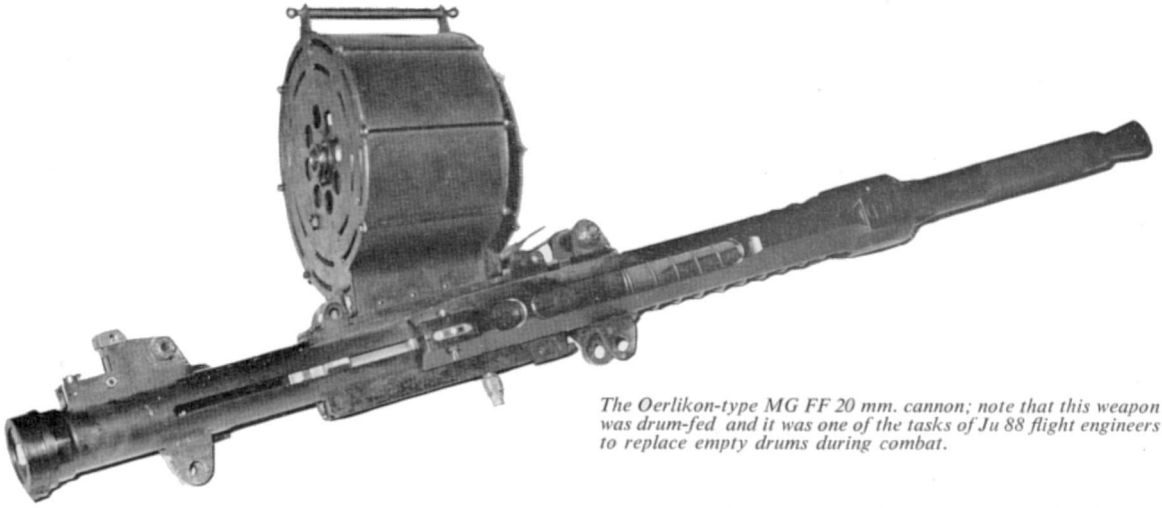
The first heavy fighter version of the Ju 88 to be built as such "from the ground up" was the C-4, which replaced the C-2 on the production lines in 1941. The new variant had a new wing with a span increased from 59 ft. 11 in. to 65 ft. 10½ in., and there was increased armour protection for the crew; this type was the first to have no provision for the carriage of bombs internally.

During 1941 the German night defensive system began to take shape. The night fighters were directed on to their targets by means of instructions radioed from the ground. A line of fighter control radar stations, one station every twenty miles, formed a barrier through which the attackers had to pass. The barrier was shaped like a giant sickle: the "handle" ran through Denmark from north to south, and the "blade" curved through Northern Germany, Holland, Belgium and Eastern France to the Swiss frontier. Each control station had an effective range of thirty miles. The new tactics bore the code-name *Himmelbett* (four-poster bed).

Under the *Himmelbett* system the night fighter units' operational areas were all neatly defined, generally within thirty miles of base. These tactics did not demand great range or endurance from the defending fighters, and the task was well within the capabilities of the relatively cheap and plentiful Bf 110. Ju 88C production therefore continued with a low priority, and during 1941 only 65 were built—and not all of these went to the night fighter force.

The Ju 88C-4; I/NJG 2 used these aircraft for intruder sorties against British airfields in the spring and summer of 1941. (Photo: H. J. Nowarra)





The Oerlikon-type MG FF 20 mm. cannon; note that this weapon was drum-fed and it was one of the tasks of Ju 88 flight engineers to replace empty drums during combat.

THE ADVENT OF RADAR

The system of ground controlled night fighting worked well on moonlight nights, but General Kammhuber had foreseen that the time would come when the bombers would attack on dark nights, too. In anticipation of this he had asked the Telefunken company to build a radar set small enough to be fitted into a night fighter. In July 1941 the set—the *FuG 202 Lichtenstein BC*—underwent its first flight trials. The radar worked on a frequency of 490 megacycles; it had a maximum range of two and a half miles and a minimum range of 200 yards. In February 1942 the first *Lichtenstein* equipped fighters arrived at Leeuwarden, for service with N.J.G. 1. The new airborne radar gained immediate unpopularity amongst night fighter crews: the set had its fair share of the teething troubles inseparable from any new electronic device; moreover, the cumbersome aerial array clipped 5 m.p.h. off the top speed of the Ju 88. In time the "bugs" were ironed out of *Lichtenstein BC* and by the autumn of 1942 the majority of German night fighters were fitted with it, or its simplified mass produced version, the *FuG 212 C-1*.

At the end of 1941 the Ju 88C-6 appeared, the first of the fighter variants to be produced in any quantity. The C-6 was armed with a forward firing armament of three MG FF 20 mm. cannon and three 7·9 mm. machine guns. There was provision for a rearward firing armament of two machine guns, one above and one below the fuselage, but most night fighters flew without these weapons. Power was from two Jumo 211J engines. The C-6a was the day fighter version while the C-6b was the night fighter, fitted with *Lichtenstein* radar.

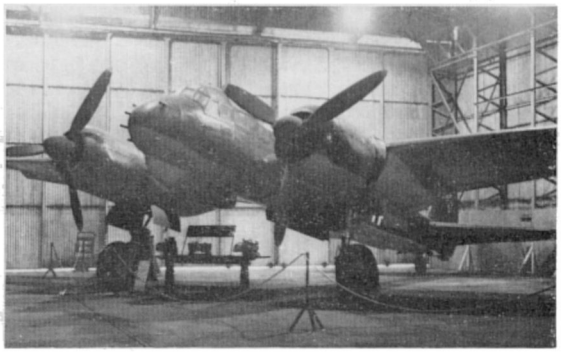
A total of 257 Ju 88C-6s were built during 1942; production averaged a little over twenty machines per month, a rate which did no more than make up for service attrition. By the 31st December 1942 a total of 385 Ju 88 fighters had been built. Of these a mere 65, of *all* types, were in service with the front line units. On the same date the German night fighter force comprised 389 serviceable aircraft, the great majority of them Bf 110's.

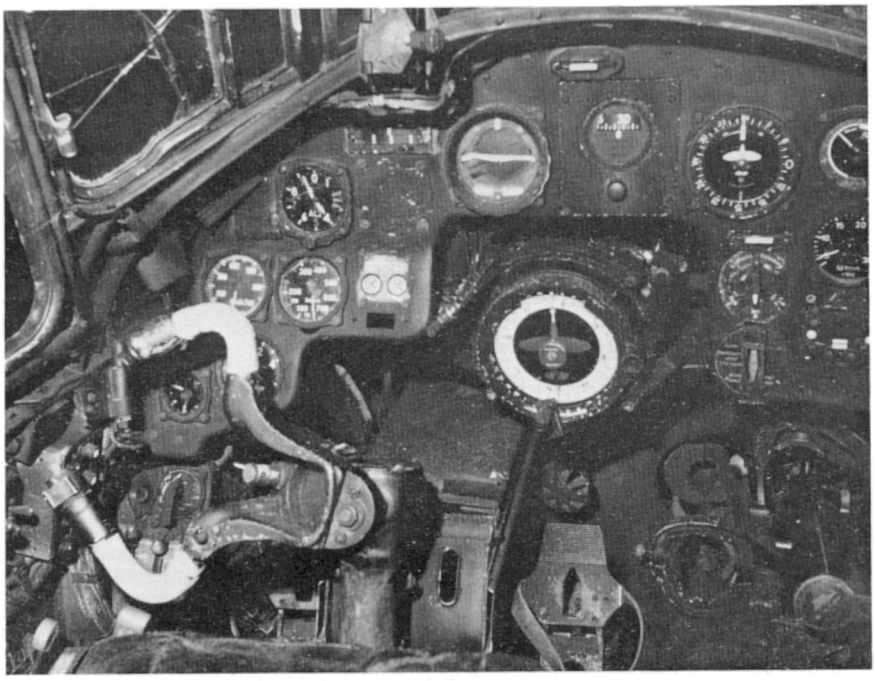
In December 1942 the R.A.F. began jamming the wireless communications between the *Himmelbett* control stations and the night fighters. Initially this jamming caused difficulties, but from April 1943 night fighters were equipped with the *FuG 16* radio in addition to the *FuG 10* set previously used; the *FuG 16* operated on frequencies between 38 and 42 megacycles, a part of the spectrum not covered by the British jamming.

The first BMW powered Ju 88 fighter variant to see service was the Ju 88R, which appeared in 1943. Apart from the air-cooled motors, which were enclosed in cowlings almost exactly the same as those of the liquid-cooled Jumo 211's, the Ju 88R-1 was identical to the C-6b.

A Ju 88C-6b with Flensburg *homing device and* Lichtenstein BC *radar.* (Photo: Imp. War. Mus. HU2864)

This Ju 88R-1 is preserved at R.A.F. Biggin Hill, Kent, U.K.; there is some evidence to suggest that it is the machine originally brought to England by German defectors in 1943.





The cockpit of the Ju 88R-1; R.A.F. pilots who flew this aircraft were impressed by the quality of the gyro compass and artificial horizon, but complained about the cramped layout and poor visibility. Note the cannon breech in the cockpit floor to the right of the rudder pedals.
(Photo: J. L. E. Maskall)

R.A.F. ASSESSMENT

On 9th May 1943 the R.A.F. received a most welcome gift: that evening a crew from N.J.G. 3 defected to Britain, bringing with them a Ju 88R-1 complete with *Lichtenstein BC.** They landed at Aberdeen/Dyce. Within days the aircraft was undergoing trials at Farnborough, flown by Squadron Leader Hartley and with Wing Commander Jackson operating the radar. The German fighter was pitted against a Halifax of the Bomber Development Unit, while the latter tried out each of the evasive manoeuvres in the Bomber Command repertoire. For realism the trials were flown at night, and the mock dogfights were fought with such enthusiasm that on one occasion the Ju 88 very nearly collided with the Halifax ! Though none of the Halifax's manoeuvres actually shook off the Ju 88, the trials did prove that the corkscrew, correctly executed, made accurate shooting very difficult indeed. In July 1943 the Ju 88—an old machine which R.A.F. technicians had managed to keep airworthy only with the greatest difficulty—blew the cylinder head on one of its engines; the trials ceased abruptly.

However the two R.A.F. officers had been able to form an impression of the Ju 88's worth as a night fighter. Hartley noted:

> "At the heights tested (between 11,000 and 14,000 feet) this aircraft is less efficient as a night fighter than the Beaufighter VI with Mk. IV A.I. (radar), although it is more pleasant to handle and may prove to be faster. The majority of its defects, i.e. cramped layout, lack of a broad windscreen and poor visibility, are traceable to its dive bomber origin.
>
> "The absence of a large flat windscreen makes itself felt when flying at night. The pilot always has the impression of peering out between prison bars, and his vision through any one panel is limited. The excellent handling qualities of this aircraft are to a considerable extent offset in night combat by the poor visibility from the pilot's seat. Provided the target can be viewed through either the left or right front panel, it is easily seen, but it is very much harder to see through the curved panels below these. When following a violently manoeuvring bomber the pilot is forced to place

**There is some evidence to suggest that this aircraft is the one preserved at Biggin Hill.*

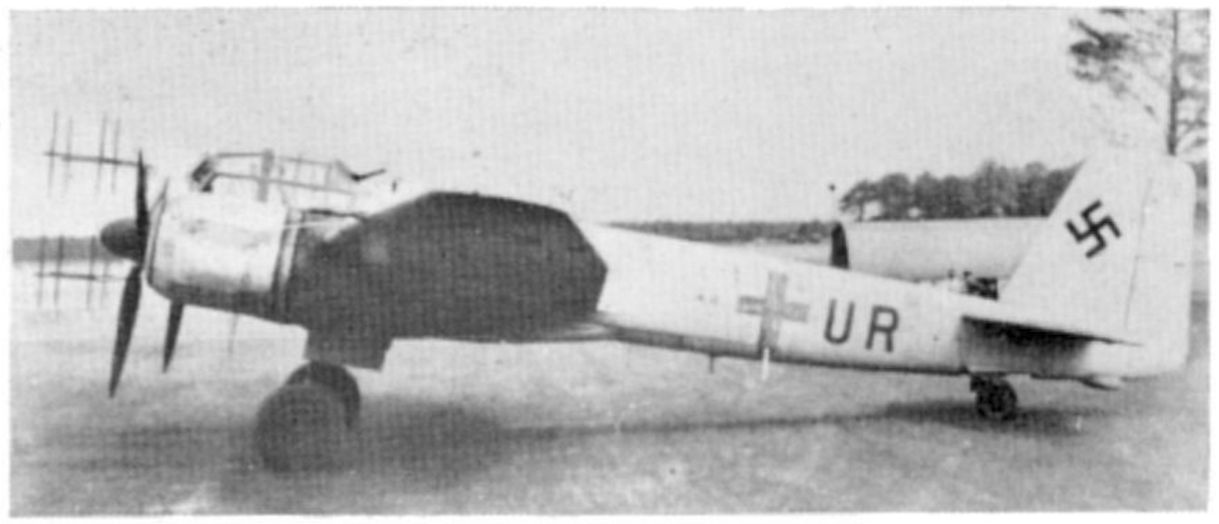
Major Prince Heinrich zu Sayn Wittgenstein, holder of the Ritterkreuz *with Swords and Oak Leaves, who was killed in action on 21st January 1944 while flying a Ju 88 night fighter (coded R4+XM) as* Geschwader Kommodore *of NJG 2. The Prince died the top-scoring* Luftwaffe *night fighter ace, with 83 confirmed kills to his credit.*
(Photo: *Studiengruppe Luftwaffe*)

his head in unnatural and uncomfortable positions in an attempt to keep the bomber silhouette in the most favourable panel. The left hand front panel is the most satisfactory, but it is small, and is partially obstructed by the sight. Failure to keep the silhouette in this panel results in temporary loss of the visual while it passes behind a 'prison bar', and often in permanent loss if the range is long. The limitations of vision and the positioning of the sight close to one of the 'prison bars' will make deflection shooting, particularly in right hand turns, even harder than is usual at night."

Jackson found the *Lichtenstein BC* radar to be roughly comparable with the British A.I. IV, though the more cumbersone aerial system used with the German set produced a narrower beam, which made it easier to follow small movements by the target.

The *Himmelbett* system of night fighter control took a heavy toll of the raiders until the night of 24th July 1943, when the R.A.F. started using "Window". "Window" was the code-name given to the bundles of strips of metal foil, cut to one half the wavelength of both *Lichtenstein* and the German ground fighter control radar. Dropped at a rate of one per minute from each aircraft in the attacking force, the bundles broke up to form clouds of radar reflective strips; the "clouds" combined to form a "smokescreen", in which radar controlled interceptions were impossible.

"Window" paralysed the *Himmelbett* system, but the *Luftwaffe* evolved new defensive tactics remarkably quickly. From August 1943 the German night fighter force abandoned the idea of the barrier in front of industrial areas, and instead concentrated all available aircraft over the target itself. At the target light from fires, target markers and searchlights combined to produce near-daylight conditions. Their prey thus illuminated, the fighters attacked visually. Instead of the previous, rather gentlemanly methods, *Luftwaffe* crews now ranged the length and breadth of Germany after the bombers. It became almost commonplace for fighters based in Denmark to engage raiders over southern Germany; when the fuel ran low the fighters landed wherever they could. The tactics bore the apt code-name *Wilde Sau* (Wild Boar).



4R+UR, a Ju 88G-1 of 7/NJG 2, pictured after its inadvertent landing at Woodbridge in Essex during the early hours of 13th July, 1944. This aircraft furnished the R.A.F. with vitally important information about the SN-2 *radar installation and the* Flensburg *homing device.*
(Photo: Imp. War Mus. HU2735)

The Bf 110 was not well suited to the new methods. It lacked the necessary endurance, and many of these aircraft crashed simply because they ran out of fuel. Far more Ju 88 night fighters were now needed. At the end of August 1943 the type equipped only a small fraction of the night fighter force. Just one *Gruppe*, IV./N.J.G.3,* based at Lüneburg and Kastrup, was fully equipped with the Ju 88. Other units partially equipped with it were IV./N.J.G. 1 at Leeuwarden, Stab/ and I./N.J.G. 2 at Nellingen, I./N.J.G. 3 at Vechta, II./N.J.G. 3 at Wunstorf and I./N.J.G. 100, I./N.J.G. 200 and II./N.J.G. 200 on the Eastern Front.

**With 27 aircraft.*

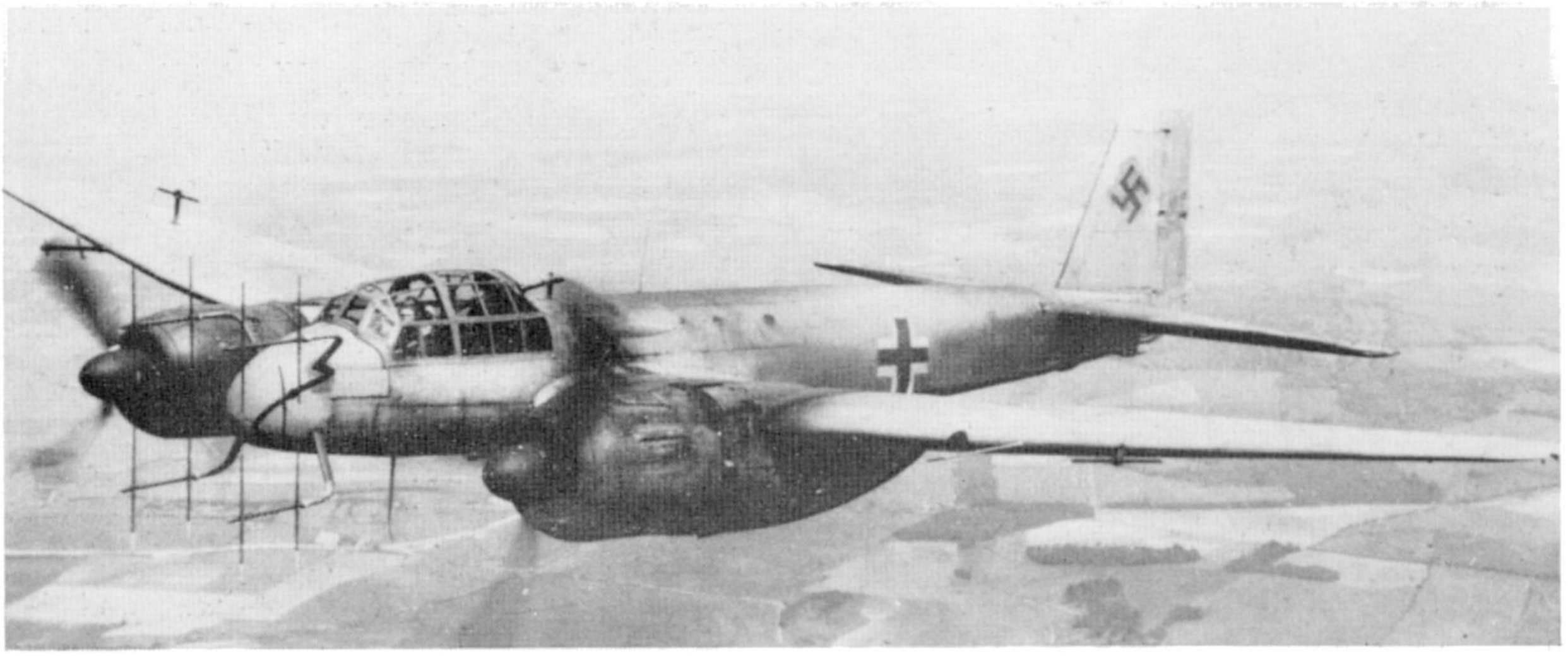
NEW ARMAMENT AND RADAR

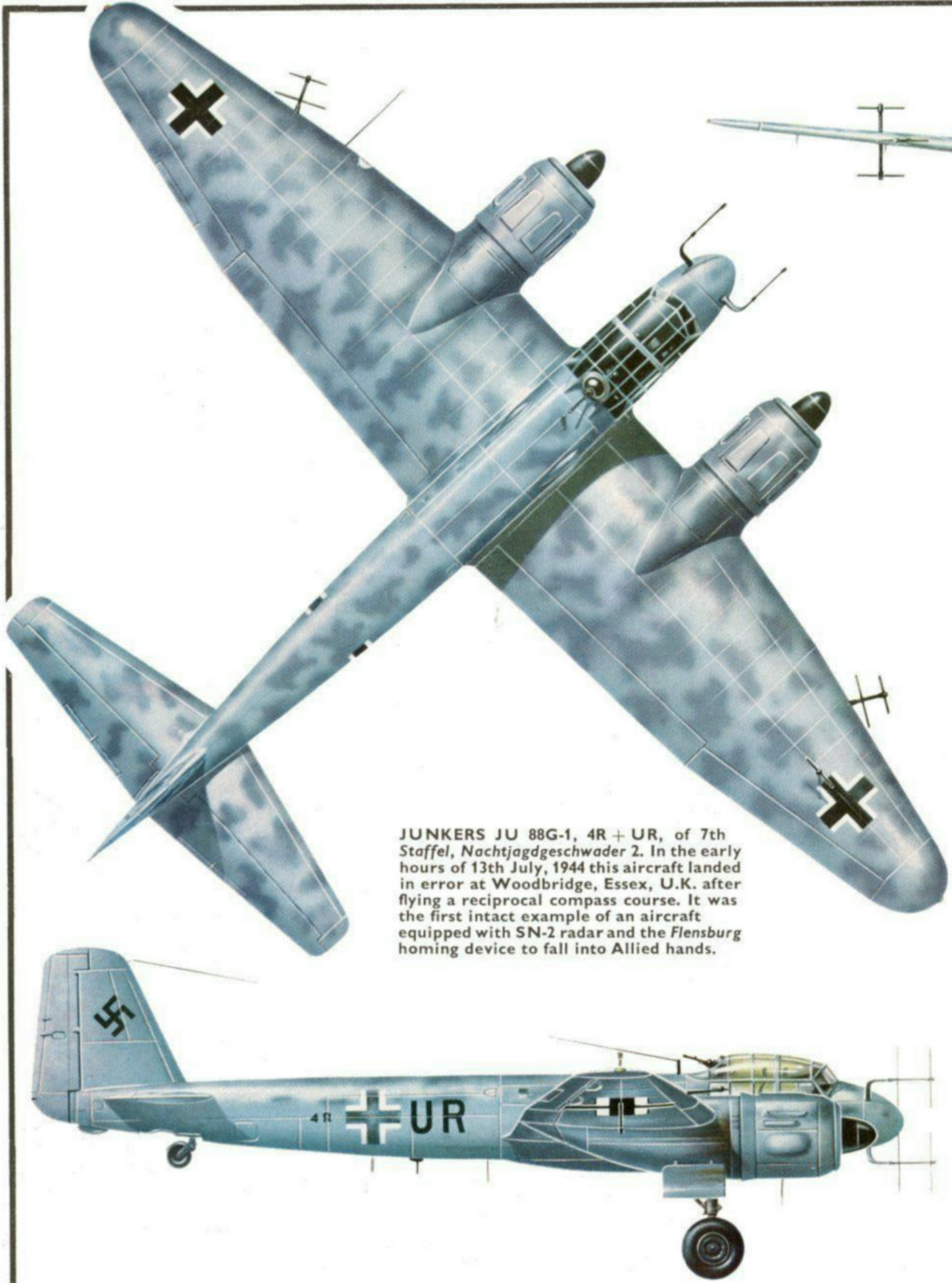
To meet the new requirement the production of Ju 88 night fighters was stepped up during the second half of 1943, and during the year 706 C and R models were built.

Many of the aircraft now coming off the production lines were fitted with a *Schräge Musik* installation, consisting of a pair of 20 mm. MG 151 cannon mounted mid-way along the fuselage, arranged to fire upwards and forwards. Sighting was by means of a reflector sight attached to the roof of the cockpit above and slightly in front of the pilot's head. The angle to which the guns were set depended, within

(*continued on page 10*)

One of the more famous air-to-air views of the Ju 88G, this photograph shows 4R+UR during its flight trials with the R.A.F. At this stage the machine wore British roundels; these have been retouched out on the print and replaced by spurious Luftwaffe *markings. One piece of evidence is the aerial of the British V.H.F. radio mounted on the fuselage behind the cockpit.*
(Photo: Imp. War Mus. HU2736)





JUNKERS JU 88G-1, 4R + UR, of 7th *Staffel, Nachtjagdgeschwader* 2. In the early hours of 13th July, 1944 this aircraft landed in error at Woodbridge, Essex, U.K. after flying a reciprocal compass course. It was the first intact example of an aircraft equipped with SN-2 radar and the *Flensburg* homing device to fall into Allied hands.

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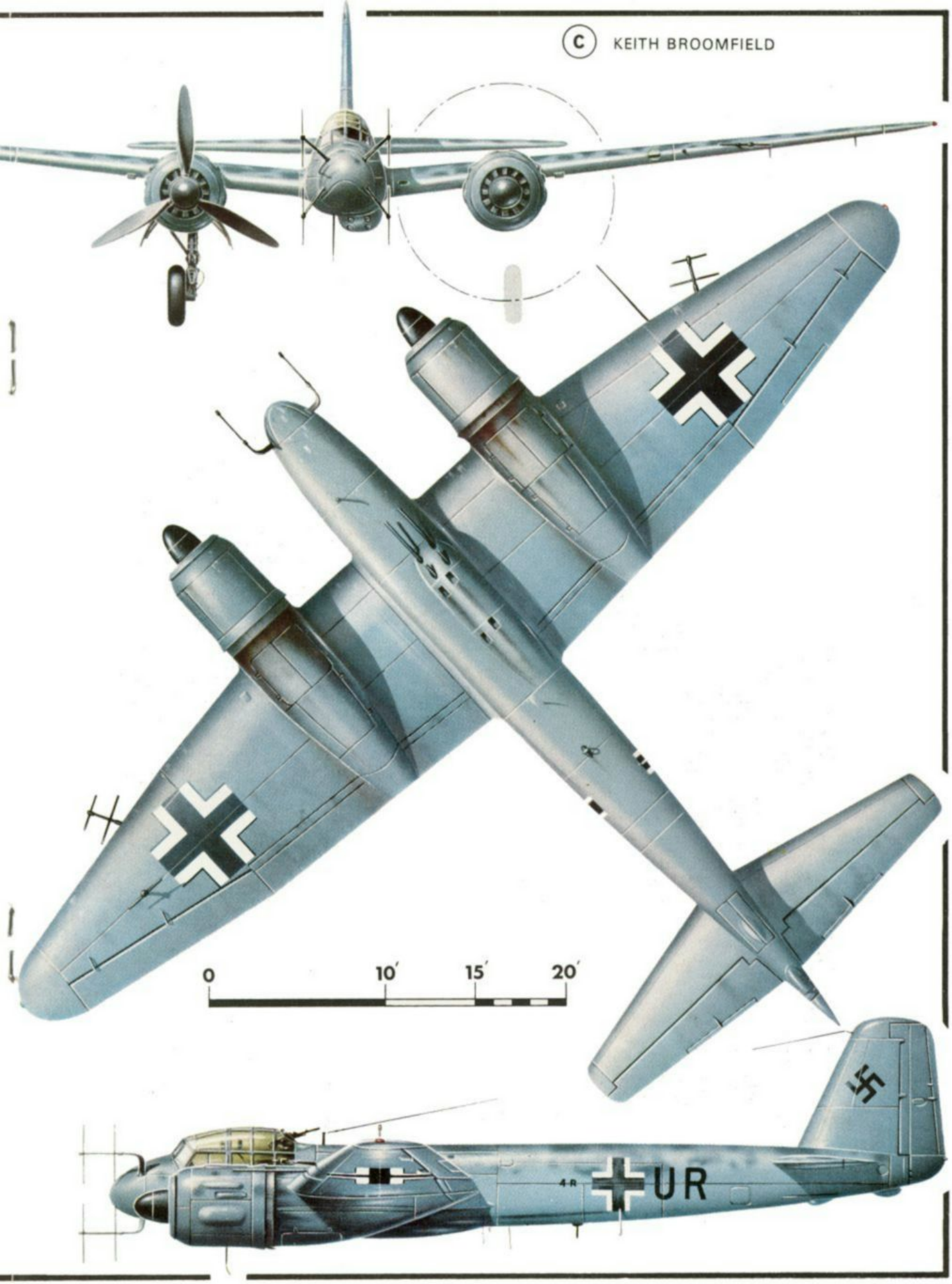
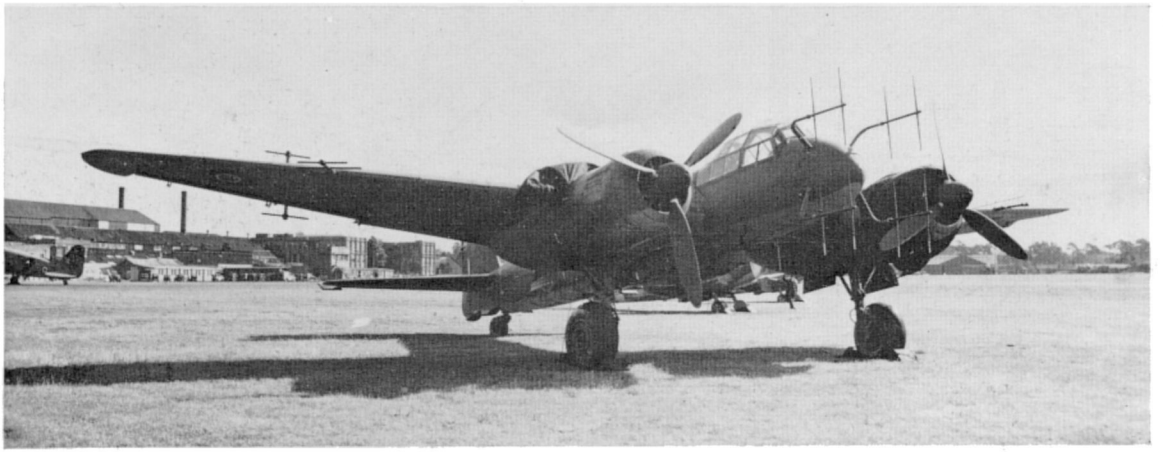




A view of 4R+UR at Farnborough; note Flensburg *array on starboard wing.* (Photo: Crown copyright)

limits, upon the wishes of the individual pilot; between 70 and 80 degrees was most usual. The upwards-firing guns were loaded with non-tracer ammunition, to enable the fighter crew to maintain the element of surprise for as long as possible while attacking from underneath the bomber.

The *Wilde Sau* tactics were surprisingly successful but they were no more than a stop-gap, pending the introduction of new equipment which could operate in the face of "Window" jamming. At the end of 1943 three new devices appeared, to enable night fighters to find their quarry: the *FuG 220 Lichstenstein SN-2*, the *FuG 227 Flensburg* and the *FuG 350 Naxos*.

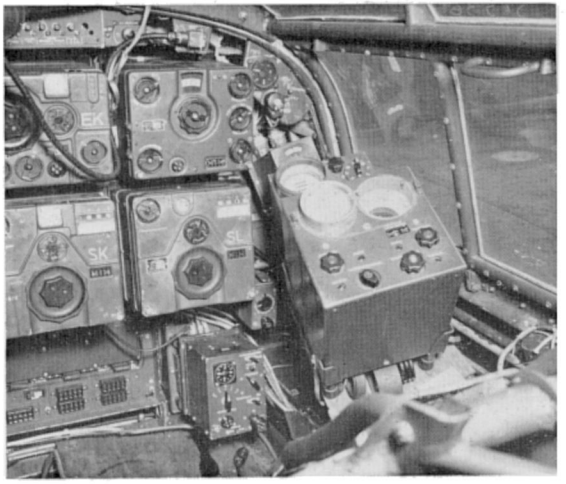
SN-2 was a radar which operated on a frequency of 90 megacycles, a part of the spectrum not covered by the "Window" then being dropped by R.A.F. bombers. The new set gave a maximum range of 4 miles and a minimum range of 400 yards. The latter figure was a serious disadvantage, since it exceeded the range at which a "visual" could normally be expected. Some fighters carried *Lichtenstein BC* or *C-1* in addition to *SN-2*, to plug this minimum range gap; the result was a veritable forest of aerials on the nose and wings of the aircraft. Eventually the *SN-2* minimum range problem was solved, and night fighters were able to operate effectively using this set alone. The first Ju 88 variants to carry *SN-2* were the C-6c and the R-2.

The *Flensburg* device was a radar receiver, tuned to the frequency of the R.A.F. bombers' "Monica" tail-warning sets. By making use of enemy emissions German crews were able to home on to the bomber streams from great distances.

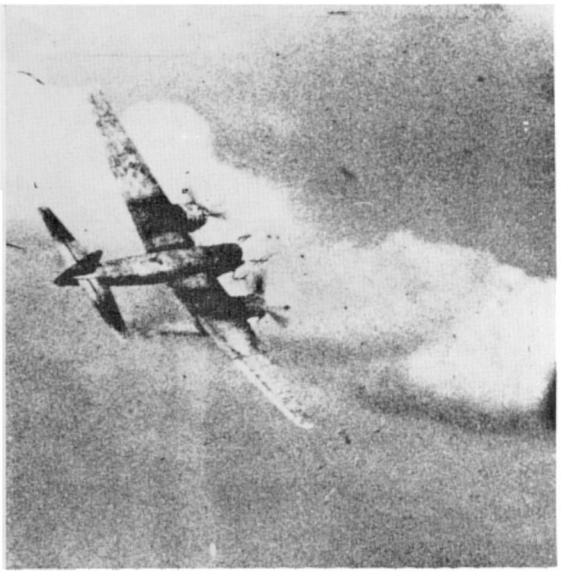
Like *Flensburg*, the third of the new German devices, *Naxos*, was a radar receiver. It was tuned to the frequency of the H2S radar sets fitted to the R.A.F. Pathfinders.

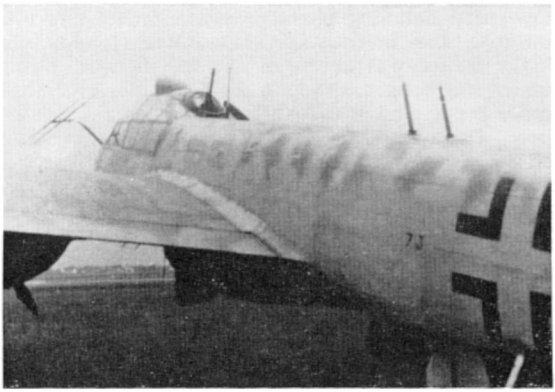
With the new electronic equipment the German night fighter force regained the flexibility which "Window" had denied it. The fighters were now directed into the bomber stream not only at the target, but also during the approach and withdrawal flights.

The radio operator's position in 4R+UR, which proved so interesting to the scientific intelligence section of the R.A.F. The SN-2 *indicator box, with two cathode ray tubes, is on the right, with the single-tube* Flensburg *homer indicator above it. The boxes on the left of the radar indicator belong to the aircraft radio installation.* (Photo: Crown copyright)



German night fighters caught in the open in daylight were easy prey for the Allied single-seaters which roamed the length and breadth of Germany during the final year of the war. In this remarkably clear picture (for a camera-gun photograph), a Ju 88C weaves desperately in a vain attempt to shake off its hunter. (Photo: Crown copyright)





Two 20 mm. MG 151 cannon in a Shräge Musik *installation pointed obliquely upwards from the fuselage; a single 15 mm. MG 131 in the rear of the cockpit provided a token rear defence. Note the code of NJG 102, "7J" in small characters ahead of the outline cross.*

A Ju 88G-7a; note engine and camouflage details.

The new German tactics, code-named *Zahme Sau* (Tame Boar), were aimed at setting up long running battles.

THE FIGHTING PRINCE

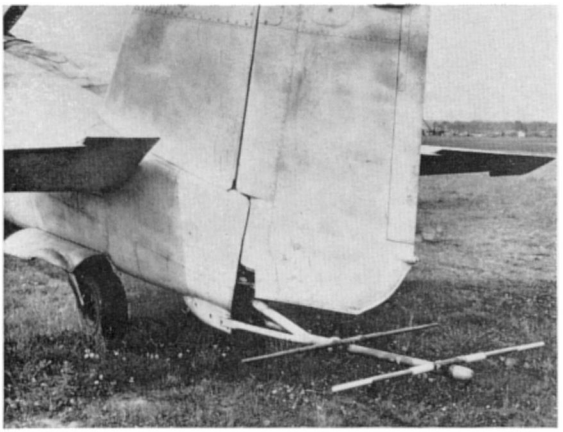
The top-scoring *Luftwaffe* night fighter ace at the beginning of 1944 was Major Prince Heinrich zu Sayn Wittgenstein, *Kommodore* of N.J.G. 2. Wittgenstein flew a Ju 88, R4+XM, on the night of 21st January 1944, when he shot down four bombers. He took off on a *Zahme Sau* patrol at 21.00 hrs. and an hour later his radar operator, *Feldwebel* Ostheimer, picked up the first contact on the *SN-2*. Within minutes Ostheimer had guided the Prince into a firing position, and the first burst sent the bomber—a Lancaster—spinning down in flames. When it hit the ground there was a bright flash as the bomb load went off. Ostheimer resumed the search with *SN-2*, and observed six contacts: the Ju 88 was in the middle of the bomber stream. During the next forty minutes—from 22.10 to 22.50—the Prince shot down three more bombers. Then, in Ostheimer's words:

> "Again I had a target on my search equipment. After a few corrections we again saw a Lancaster. There was one attack, and it caught fire in the fuselage. The fire started to go out, and we moved into position for a new attack. We were again in position and Major Wittgenstein was ready to shoot when, in our own machine, there were terrible explosions and sparks. It immediately caught fire in the left wing, and began to go down. As I saw this the canopy above my head flew away, and I heard on the intercom. a shout of "*Raus* !" (Get out !). I tore off my oxygen mask and helmet, and was then thrown out of the machine. After a short time I opened my parachute, and landed east of Hohengöhrener Dam, near Schönhausen."

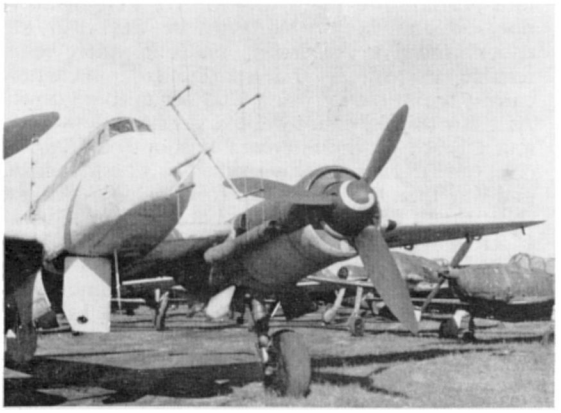
Wittgenstein's body was found the next day. He died with 83 night kills to his credit. Almost certainly his Ju 88 was shot down by one of the other bombers in the stream; some R.A.F. long-range night fighters were active in the target area, but none made any claim. That night Bomber Command lost 55 out of the force of 648 aircraft which set out for Magdeburg.

This Ju 88G-7a bearing the markings of NJG 102—a night fighter training unit—displays its armament and radar details. The Hirschgeweih *aerial array on the nose belongs to the* SN-2 *radar; the elements, each 125 cm. long, are canted through 45° to reduce interference. The dome on top of the cockpit contains the rotating aerial of the* Naxos *homing device, and the gun blister under the fuselage mounts four 20 mm. MG 151 cannon.*

(Photo: Crown copyright)



A rearward-facing aerial fitted to the SN-2 *set enabled the crew to detect enemy long-range night fighters approaching from behind.* (Photo: Crown copyright)



Ju 88G-7b fitted with FuG 218 Neptun *radar and a* Hirschgeweih *aerial array. The elements were shorter than those used with* SN-2, *measuring only 90 cm. Note the belly entrance/escape hatch.*

The R.A.F. had suffered heavily on 21st January 1944, but worse was to come. On 28th January, 43 bombers were lost out of 683 attacking Berlin, and on 19th February, 78 were lost out of 823 attacking Leipzig. On 24th March, 72 aircraft of a force of 811 attacking Berlin were lost. The climax of the so-called "Battle of Berlin" came on the night of 30th March, when the *Luftwaffe* night fighter force succeeded in bringing down 94 out of 795 bombers attacking Nuremberg. With their new radar equipment and the *Zahme Sau* tactics, the Germans were making the bombing of their homeland a very expensive proposition. However Bomber Command now shifted its main effort to communications targets in France and Belgium, in preparation for the forthcoming invasion. For the first time since the summer of 1940 the German cities enjoyed a respite.

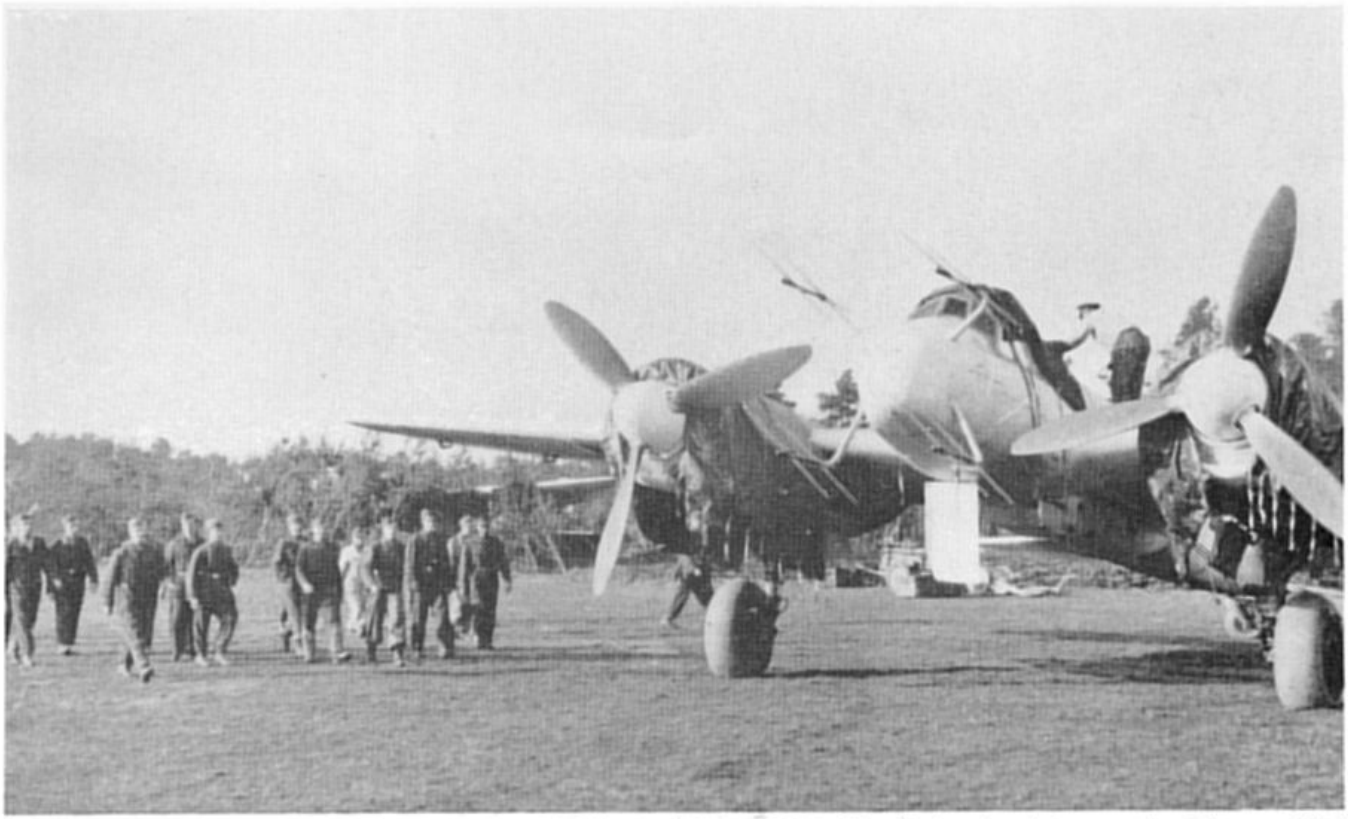
THE JU 88G APPEARS

With the introduction of the extra wireless and radar equipment, *Schräge Musik*, and the additional fuel necessary for *Zahme Sau* operations, the weight of the Ju 88 steadily rose. As the weight went up so did the stalling speed, and in turn the take-off and landing speeds—all to the detriment of the aircraft's low-speed handling characteristics. In an effort to improve the inadequate longitudinal stability, the night fighter was shorn of the assymetrical blister under the nose, and was fitted with the larger and more angular fin already proven on the Ju 188 bomber. The new night fighter variant was designated Ju 88G.

The Ju 88G-1 entered service with the *Luftwaffe* in mid-1944. It was powered by two 1,700 h.p. BMW 801 motors, and carried its entire forward firing armament of four 20 mm. MG 151 cannon in a shallow blister almost mid-way down the fuselage, where the muzzle flash could not impare the pilot's night vision. The next four sub-types, G-2 to G-5, were all projected variants differing only in the equipment which was to have been fitted. The Ju 88G-6 was similar to the G-1 but had BMW 801G motors; the G-6a and 6b versions differed only in the radio equipment fitted, while the G-6c was powered by two 1,750 h.p. Jumo 213A engines.

During the spring and early summer of 1944 the *Luftwaffe* night fighter force stood ready, confident in its ability to strike telling blows whenever Bomber Command resumed its attacks on Germany. But although they did not know it, the defenders had passed their peak. One reason for the German successes at the beginning of 1944 had been the veil of secrecy which surrounded the three new search devices, *SN-2*, *Naxos* and *Flensburg*. On the 13th July 1944 most of this covering was torn away. That morning a Ju 88G-1 of 7./N.J.G. 2, 4R+UR, landed at Woodbridge in Essex; its pilot had mistakenly flown a reciprocal compass course when returning from his patrol line over the North Sea. R.A.F.

The radio operator's position, showing the indicators for the SN-2 *radar* (*right*) *and the* Naxos *homing receiver* (*left*). (Photo: Crown copyright)



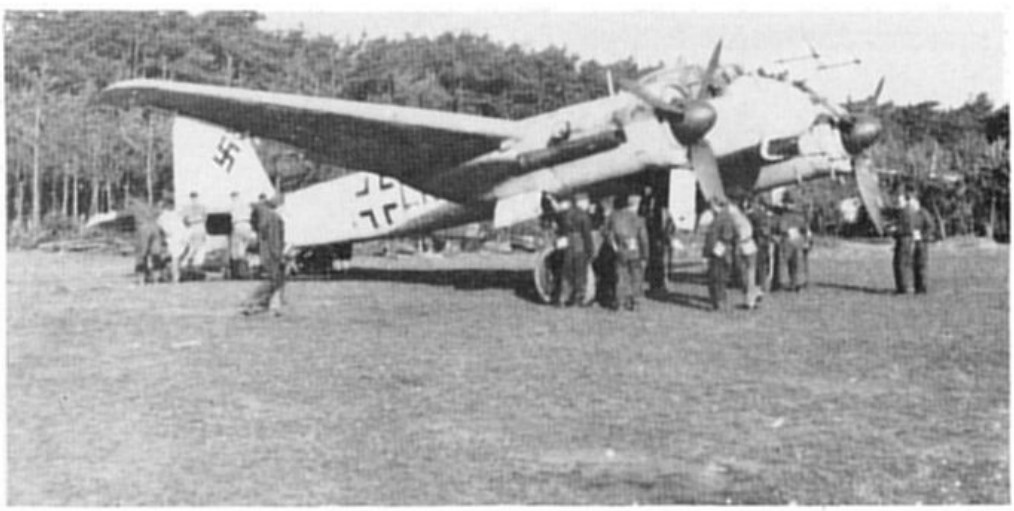
Above *and* below: Luftwaffe *ground crewmen "pre-flight" a Ju 88G-7a of NJG 100. During the closing months of the war Allied fighter-bombers were a constant menace; heavily camouflaged aircraft are just visible in the background. NJG 100 operated on the Eastern Front, and its aircraft did not normally carry any of the homing devices, which were tuned to radar sets used by the R.A.F.*
(Photos: courtesy Hans Obert)

experts eagerly examined the windfall, which was fitted with *SN-2* and *Flensburg*. The new knowledge was quickly applied, and from the 23rd July Bomber Command aircraft began dropping a new type of "Window" which jammed the frequency used by *SN-2;* the strips of foil had as great an impact on the new radar as they did on *Lichtenstein BC* almost exactly a year earlier.

Like its predecessor, the captured Ju 88G was taken to Farnborough for flight testing. The *Flensburg* homing device aroused considerable interest, and Wing Commander Jackson conducted a series of trials with it. These culminated on 30th August when a force of 71 Lancasters, all transmitting with "Monica", flew a circular route over southern England to test the homer under operational conditions. Jackson first observed "Monica" signals on *Flensburg* when the bombers were 45 miles away from him, and was able to pass directions to his pilot to bring him into a firing position on individual Lancasters using the homer alone. As a direct result of these trials "Monica" was removed from all R.A.F. main bomber force aircraft.

Late in 1944 the final version of the Ju 88 fighter to reach production, the G-7, appeared. It was powered by two Jumo 213E motors fitted with water-methanol injection*. The G-7 sub-types carried each of the night fighter radar devices to see service in the *Luftwaffe* during the final months of the war. The G-7a was fitted with the *SN-2* with an additional aerial under the fin to give warning of enemy intruders approaching from behind. The G-7b carried the *FuG 218 Neptun* radar, some with the *Morgenstern* aerial system in which the elements were partially enclosed by a pointed wooden nose cone to reduce drag. The *Neptun* frequencies around 170 megacycles allowed two months freedom from interference before the R.A.F. found out about them, and jammed these too. The Ju 88G-7c was the first

**Water to cool the petrol/air charge in the cylinders and thus allow a higher boost setting; methanol to prevent the water from freezing.*



The final variant of the Ju 88 night fighter series, the G-7c. Ten examples were built before the German collapse; this aircraft carried the centimetric wavelength FuG 240 Berlin N-1a *radar.* (Photo: Imp. War Mus. MH4884)

German night fighter to carry the centrimetric wavelength *FuG 240 Berlin N-1a;* ten examples of this model were built before Germany collapsed. Production of the Ju 88 night fighter continued until the end; 2,518 left the factories in 1944, and 355 in 1945.

With the compromise and subsequent countering of *SN-2* and *Flensburg*, followed a little later by *Naxos* and *Neptun*, the effectiveness of the *Luftwaffe* night fighter force fell almost to zero. But this time there was to be no recovery. On every front the war was going against Germany, and time was running out. First the capture of France punched a great hole in the German radar network, cutting the warning time of raids to a minimum. Then in the autumn of 1944 the *Luftwaffe* fuel reserves—always too low for comfort—steadily wasted away as production failed to meet consumption. On 31st December 1944 the German night fighter force had 913 serviceable aircraft on strength; but the great majority of them were grounded for want of fuel. By the 9th April 1945 this number had whittled to 563 aircraft, of which about 350 were Ju 88s. When the end came the *Nechtjagd*, once the élite arm of the *Luftwaffe*, succumbed to pressures beyond its control.

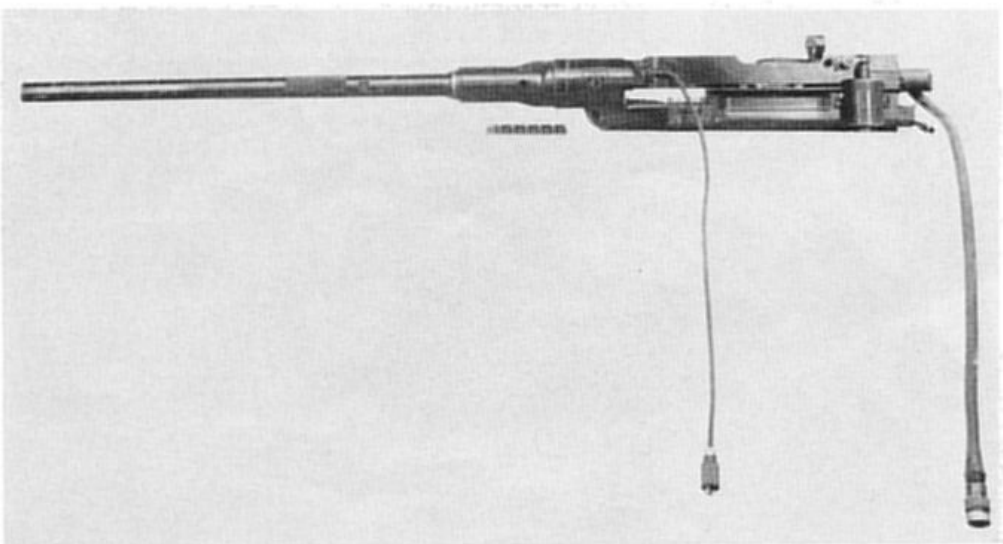
Construction

The wings of the Ju 88 were entirely of metal, built separately and attached to the fuselage by ball and socket joints at the top and bottom flange of each of the two main spars. The trailing edge was hinged along its entire length, the inner sections acting as flaps and the outer sections as ailerons; the ailerons drooped with the flaps when the latter were selected down. There were four fuel tanks in the wings, two inboard and two outboard of the engines.

The fuselage, like the wings, was an all-metal structure. It was built up in three parts: the nose section, the centre section and the tail. The nose section comprised the forward part of the fuselage, up to the rear of the crew compartment; it was skinned in 20 gauge light alloy. The centre section, skinned in 18 gauge alloy, was fitted with three bulkheads: one was at the rear of the crew compartment, one divided the fuselage self-sealing fuel tank into two, and one was level with the trailing edge of the wing. The bulkheads were of light alloy sheet, stiffened with vertical hat-section strips. The tail section was a monocoque, with "Z" section frames covered with 22 gauge stressed skin. The elevators and the rudder of the C and R versions were fabric covered, but the tail of the G was entirely of metal.

The undercarriage was of the backwards-retracting type; the main wheels rotated through 90 degrees during retraction, to lie flat in the rear of the engine nacelles. Each pair of undercarriage doors was made in two parts; when the wheels were locked down the rear doors closed again, to reduce drag.

The Jumo 211 and 213 were both liquid cooled motors; when fitted to the Ju 88 these were mounted behind circular radiators, which gave them the appearance of radial engines. The BMW 801 was a two-row radial engine.



The slim belt-fed Mauser MG 151 20 mm. cannon armed the later versions of the Ju 88 night fighter series. The scale indicator is six inches long. (Photo: Crown copyright)

SPECIFICATIONS

Junkers 88C-6b

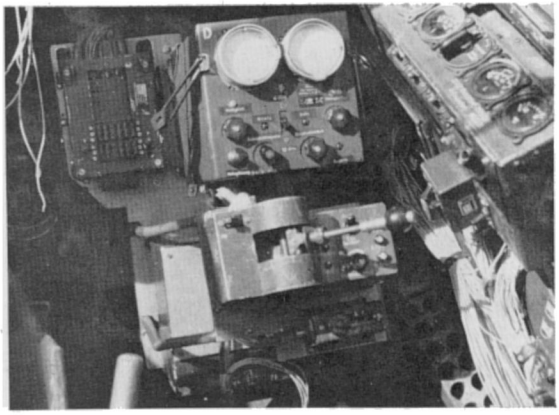
Dimensions: Span 65 ft. 10½ ins. Length 47 ft. 1½ in. Height 16 ft. 7½ ins.
Powerplants: Two 1,410 h.p. Junkers Jumo 211J twelve cylinder inverted vee liquid cooled engines.
Armament: Three 20 mm. MG FF cannon and three 7·9 mm. MG 17 machine guns firing forward. In addition some aircraft were fitted with *Schräge Musik*, an installation comprising two 20 mm. MG 151 cannon mounted to fire upwards and forwards. The defensive armament comprised up to two 13 mm. MG 131 machine guns, one firing from the rear of the cockpit canopy, the other from the rear of the blister under the starboard side of the nose.
Radar: FuG 202 Lichtenstein BC or *FuG 212 Lichtenstein C-1.* Frequency 490 megacycles. Range 2½ miles.
Weights: Empty 18,871 lb., loaded 26,125 lb.
Performance: Maximum speed 311 m.p.h. at 20,000 feet. Initial climb rate 1,470 ft./min. Service ceiling 32,500 ft. Range 1,950 miles.

Junkers 88G-7b

Dimensions: Span 65 ft. 10½ ins. Length 51 ft. 1½ ins. Height 15 ft. 11 ins.
Powerplants: Two 1,880 h.p. (2,250 h.p. emergency rating) Junkers Jumo 213E twelve cylinder inverted vee liquid cooled engines.
Armament: Four 20 mm. MG 151 cannon firing forwards from a shallow blister mid-way along the fuselage. Two MG 151 in a *Schräge Musik* installation, firing upwards and forwards. One 13 mm. MG 131 in a flexible mounting in the rear of the canopy.
Radar: FuG 218 Neptun V. Frequency: six frequencies available to the operator, between 158 and 187 megacycles. The operator would select the one with the least interference. Range 3 miles. Either *Hirschgeweih* or *Morgenstern* aerials could be fitted to this set.
Weight: Loaded 28,900 lb.
Performance: Maximum speed 389 m.p.h. at 30,000 ft. Initial climb rate 1,655 ft./min. Service ceiling 32,800 ft. Range 1,400 miles.

Radio Fitted to Ju 88G-7b, 1945

FuG 10 —High Frequency radio communications set.
FuG 16 —Very High Frequency radio communications set.
EiV 10 —Crew intercommunications amplifier.
PeGe 6 —Radio Compass.
FuBl 2 —Airfield blind approach receiver.
FuG 120—Teleprinter-like receiving device, for the reception of orders and bearing information from high-power ground beacons.
FuG 25 —Identification Friend or Foe.
FuG 101—Radio altimeter.
FuG 218—*Neptun* search radar equipment.
FuG 280—*Keil* infra-red homing device.
FuG 350—*Naxos* homing receiver.



The radar operator's position in the Ju 88G-7c, with the Berlin *indicator at the top and the scanner control lever below it.*

The aerial dish of the Berlin *radar, which was housed behind the plywood nose cone of the G-7c.*

A Ju 88G, W7+AC of Stab, *II/NJG 100 at the firing butts for cannon harmonisation. This aircraft is unusual for a machine of a unit operating mainly on the Eastern Front in that it carries* Naxos *(see blister above cockpit); note also the forward position of the* Shräge Musik, *just visible immediately behind the cockpit.*

(Photo: courtesy Hans Obert)

The end of the Nachtjagd*; row upon row of Ju 88's, night fighters and bombers together, stand abandoned on a North European airfield in the spring of 1945. Note the great variation of camouflage and marking styles.* (Photo: Imp. War Mus. CL3303)

Another Ju 88G-7b with FuG 218 Neptun *radar but fitted with the more streamlined* Morgenstern *aerial system. The aerial elements protruded through the plywood covering of the pointed nose cone.*

Units with Ju 88 night fighters on strength, 9th April 1945

Stab, I, II and III/N.J.G. 2.
Stab, I, 7 and 10/N.J.G. 3.
Stab, I, 4 and 7/N.J.G. 4.
Stab, I, 4, 7 and 10/N.J.G. 5.
Stab, I, 4 and 10/N.J.G. 6.
I/N.J.G. 100.

Note on German night fighter colour scheme

From 1943 the standard *Luftwaffe* night fighter colour scheme was light blue, with a grey mottle on the upper surfaces. Such light colours might seem incongruous for aircraft engaged on night operations, but in fact this scheme was arrived at after considerable thought. Even on the darkest night there is some light. When aircraft were seen they appeared as dark shapes, silhouetted against the lighter background of the sky. Hence the light colours, designed to reduce to a minimum the colour contrast between the aircraft and its background. A similar light colour scheme was considered for R.A.F. night bombers, but the idea was rejected because aircraft illuminated in the beams of searchlights would have become even more conspicuous.

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